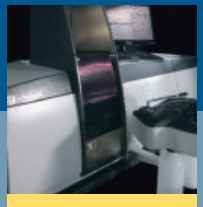
pg instruments



ELEMENTAL SPECTROSCOPY

PRODUCT BROCHURE

Analytical
Instruments
for
Science

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Analytical
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Atomic Absorption Spectroscopy

Since its development in the 1950's the Atomic Absorption Spectrometer (AAS) has evolved into an accurate and reliable analytical tool used extensively in today's modern laboratory.

AAS is an analytical procedure for the Qualitative and Quantitative determination of chemical elements in a sample. The technique is based on the Lambert-beer principle which states that the absorbance of a solution (A) is directly proportional to its path length (l) and its concentration (C) when the wavelength of incidence light remains fixed. This is summarized in the following equation, where (ε) is the molar absorbtivity.

$$A = \varepsilon lc$$

PG Instruments offer a range of instrumentation designed to meet the requirements of all industry sectors including Agricultural, Clinical, Environmental, Food, Metal, Mining and Materials, Petrochemical and Pharmaceutical. Further information about the technique and products can be found in this brochure.

AAS Principle

Atomic Absorption Spectrophotometers (AAS) have become an industry standard for many elemental determinations within specific industries. There are three AAS techniques including Flame, Graphite Furnace, and Hydride Generation, all of which have their own advantages and disadvantages due to analytical limitations. The flame technique, being the most common, will determine trace levels (usually ppm) for most analytical elements and it is also the most cost effective technique. If determinations of lower levels are required (usually ppb) the graphite technique can be used. There are a number of elements that form volatile hydrides and these can be analysed using the hydride technique.

Atomic Absorption Analysis

A hollow cathode lamp containing a coated cathode of the element that is to be analysed is used as a light source. The light source emits a beam of a specific wavelength through the flame and into the monochromator. The sample is aspirated into the flame in the form of an aerosol which is converted to an atomic vapour, atoms present in the vapour are then raised from their ground state to their excited state. The atoms absorb light of a specific wavelength when moving to an excited energy state, this causes the quantity of light absorbed to increase. The light absorption then can be measured and used for a Quantitative determination of the amount of analyte in a sample.

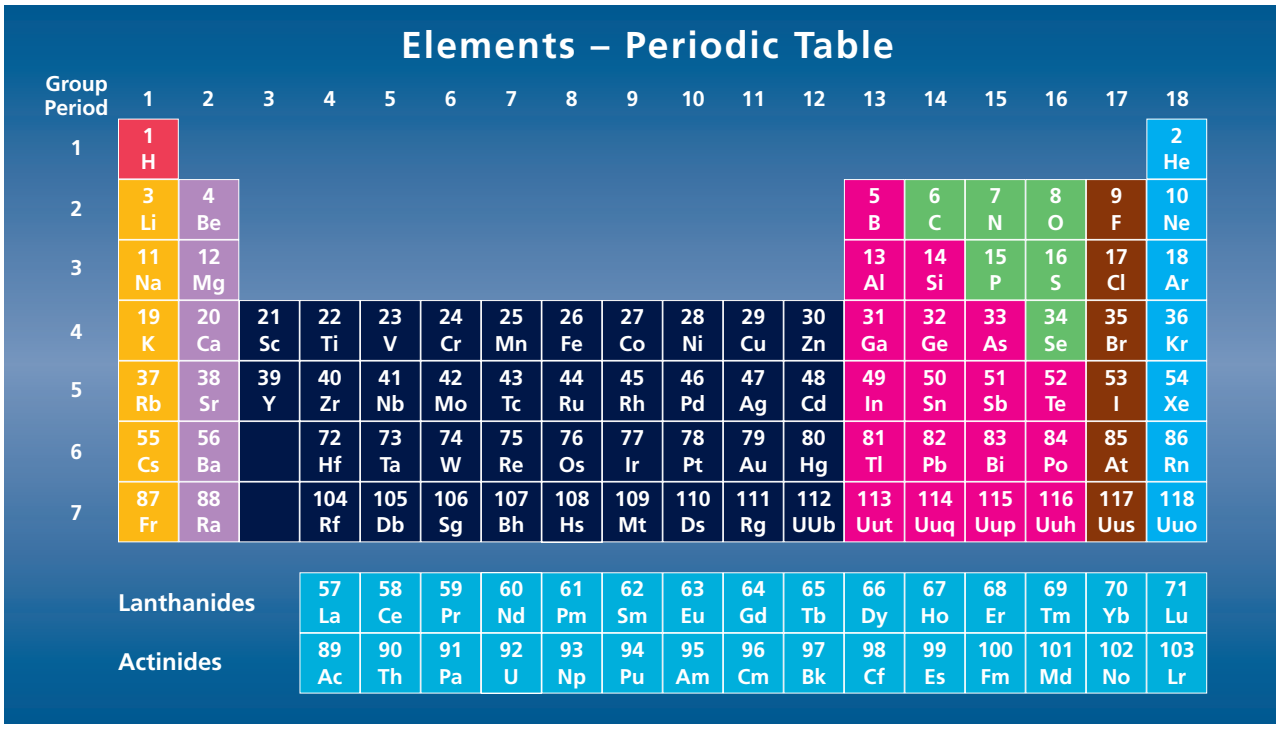
Atomic Emission Analysis

For the determination of certain elements, usually those excited at high wavelengths, a variation of the standard flame technique can be performed which is called atomic emission. As the technique relies on the spectral emission from the flame there is no requirement for the hollow cathode lamp. The sample is aspirated into the flame which causes the ground state atoms to convert to an excited state. As the excited state is very unstable the atoms return to their ground state and emit an emission spectrum consisting of a number of emission wavelengths. The intensity of an emission line will therefore increase as the number of excited atoms of the specific element increases. The specific wavelength of the emission can be used for a Quantitative analysis to determine the concentration of a element in a solution.

Instrumentation

The Atomic Absorption Spectrometer is made up of five essential components. Each component is designed to produce minimum disruption to the overall system and many design features are installed to keep the signal to noise ratio as low as possible.

- Light Source
- Burner Assembly
- Optics
- Detector
- Signal Processing


Elements – Periodic Table
Group 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Period
1 1 H 2 He
2 3 Li 4 Be 5 B 6 C 7 N 8 O 9 F 10 Ne
3 11 Na 12 Mg 13 Al 14 Si 15 P 16 S 17 Cl 18 Ar
4 19 K 20 Ca 21 Sc 22 Ti 23 V 24 Cr 25 Mn 26 Fe 27 Co 28 Ni 29 Cu 30 Zn 31 Ga 32 Ge 33 As 34 Se 35 Br 36 Kr
5 37 Rb 38 Sr 39 Y 40 Zr 41 Nb 42 Mo 43 Tc 44 Ru 45 Rh 46 Pd 47 Ag 48 Cd 49 In 50 Sn 51 Sb 52 Te 53 I 54 Xe
6 55 Cs 56 Ba 72 Hf 73 Ta 74 W 75 Re 76 Os 77 Ir 78 Pt 79 Au 80 Hg 81 Tl 82 Pb 83 Bi 84 Po 85 At 86 Rn
7 87 Fr 88 Ra 104 Rf 105 Db 106 Sg 107 Bh 108 Hs 109 Mt 110 Ds 111 Rg 112 UUb 113 Uut 114 Uuq 115 Uup 116 Uuh 117 Uus 118 Uuo
Lanthanides 57 La 58 Ce 59 Pr 60 Nd 61 Pm 62 Sm 63 Eu 64 Gd 65 Tb 66 Dy 67 Ho 68 Er 69 Tm 70 Yb 71 Lu
Actinides 89 Ac 90 Th 91 Pa 92 U 93 Np 94 Pu 95 Am 96 Cm 97 Bk 98 Cf 99 Es 100 Fm 101 Md 102 No 103 Lr

Techniques

There are three main techniques for AAS analysis each having their strengths and weaknesses depending on the type of analysis required. There are a number of factors to consider when deciding which technique will suit the application. For example:

- Detection limits
- Speed of analysis
- Sample volume
- Equipment cost
- Element suitability
- Clean area
- Running costs
- Working range
- Automation
- Sample matrix
- Precision of results
- Available space required
- Method development

Flame Analysis

Flame AAS is the standard technique used for general purpose analysis. The readings are normally accepted to be trace levels of ppm and nearly all elements can be analysed to this level. There is a choice of Air/Acetylene flame used for easily ionised elements and Nitrous Oxide/Acetylene flame for the less easily excited elements. The flame technique requires a number of extra components to complete the installation.

- Oil free Air Compressor
- Ultra pure Acetylene Gas
- Nitrous Oxide Gas (optional)
- Natural Gas/LPG (optional)
- Autosampler (optional)
- Suitable Fume Extraction System

Graphite Analysis

The graphite analysis technique uses an assembly containing a graphite tube to replace the burner. This technique is used to analyse very low levels with low sample volumes. Although the detection limit is very low, the precision is almost always higher than that of the flame technique. The graphite technique requires a number of extra components to complete the installation.

- Water Circulating System for Cooling.
- Pure Argon Gas.
- High Current Power Supply
- Autosampler (optional)
- Suitable Fume Extraction System

Hydride Analysis

The hydride technique requires an additional unit to add to the flame AAS system. The Hydride Generator is used to produce a hydride vapour, for the hydride forming elements, by means of a heated tube which fits directly to the top of the flame burner. The unit can also be used for cold vapour technique primarily for Mercury analysis. The hydride technique requires the following extra components to complete the installation.

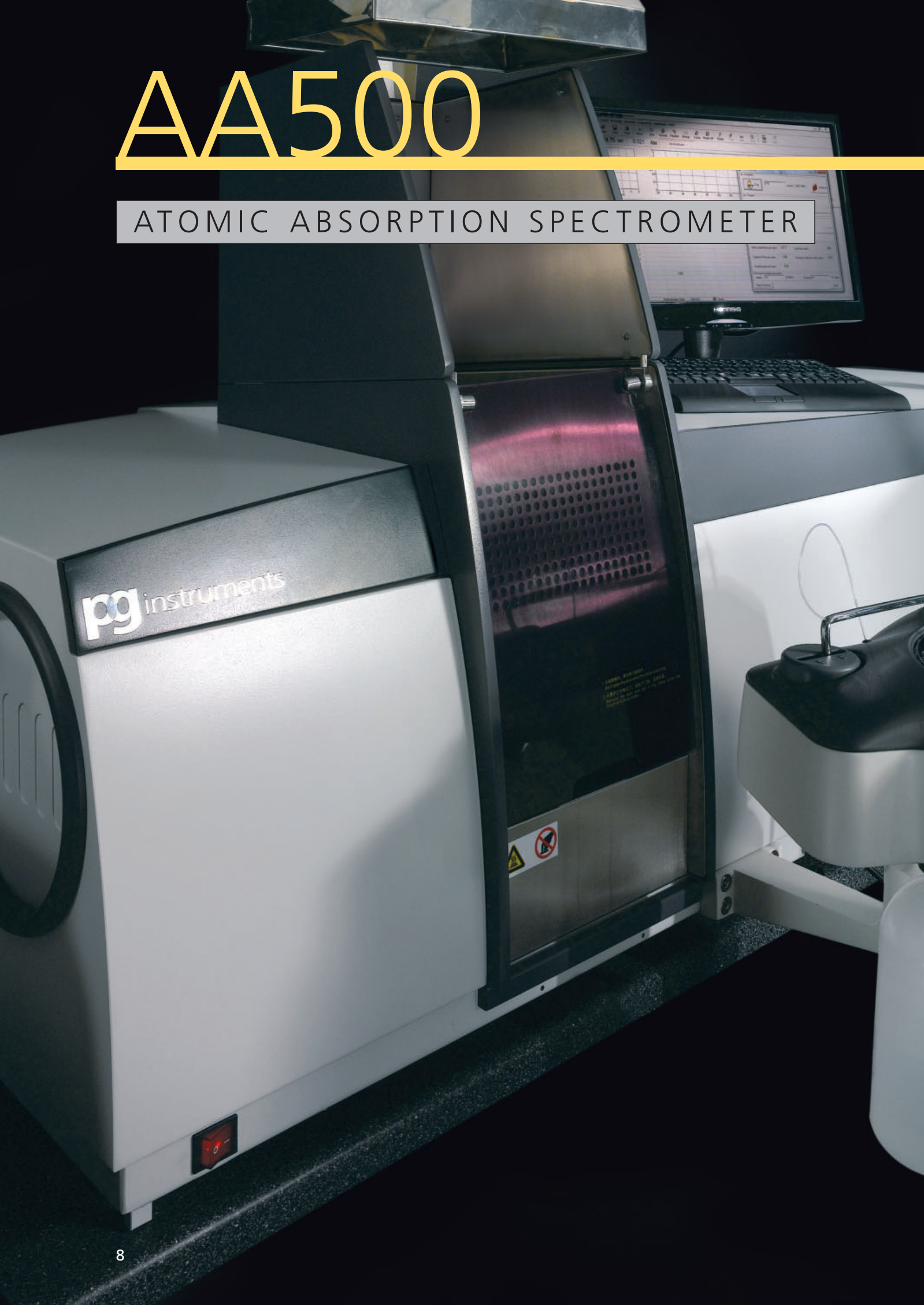
- Pure Argon gas
- Suitable fume extraction system

Detection limits

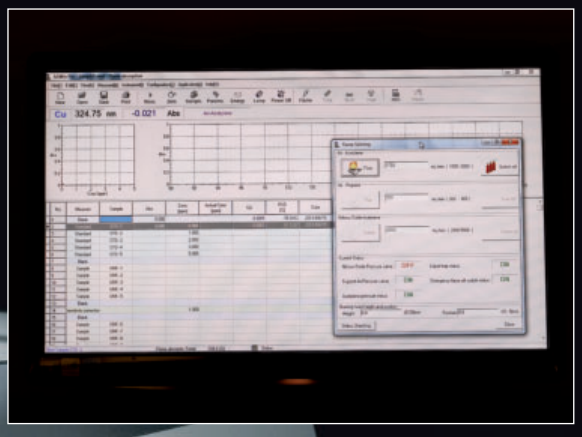
Element	Wavelength (nm)	Air/C_2H_2 mg/l(ppm)	$N_2O/C_2H_2/C_2H_2$ mg/l(ppm)	Air/LPG mg/l(ppm)	Graphite µg/l(ppb)	Vapour µg/l(ppb)
Aluminium (Al)	309.3	n/a	0.028	n/a	0.13	n/a
Antimony (Sb)	217.6	0.092	n/a	0.21	0.29	0.26
Arsenic (As)	193.7	0.12	n/a	n/a	0.33	0.05
Barium (Ba)	553.6	n/a	0.031	n/a	0.23	n/a
Beryllium (Be)	234.9	n/a	0.0036	n/a	0.02	n/a
Bismuth (Bi)	223.1	0.0049	n/a	0.03	0.26	0.19
Boron (B)	249.7	n/a	3.5	n/a	n/a	n/a
Cadmium (Cd)	228.8	0.0028	n/a	0.008	0.01	n/a
Calcium (Ca)	422.7	n/a	0.0037	0.07	0.60	n/a
Chromium (Cr)	357.9	0.0054	n/a	0.6	0.025	n/a
Cobalt (Co)	240.7	0.01	n/a	0.018	2.00	n/a
Copper (Cu)	324.8	0.0045	n/a	0.0026	0.065	n/a
Dysprosium (Dy)	421.7	n/a	0.2	n/a	n/a	n/a
Europium (Eu)	459.4	n/a	0.04	n/a	n/a	n/a
Gold (Au)	242.8	0.013	n/a	0.026	3.00	n/a
Indium (In)	303.9	0.07	n/a	0.04	n/a	n/a
Iron (Fe)	248.3	0.0043	n/a	0.015	0.06	n/a
Lead (Pb)	217.0	0.013	n/a	0.02	0.03	n/a
Lead (Pb)	283.3	0.016	n/a	0.04	0.08	n/a
Lithium (Li)	670.8	0.0021	n/a	0.004	0.70	n/a
Magnesium (Mn)	285.2	0.0022	n/a	0.002	0.09	n/a
Manganese (Mn)	279.5	0.0016	n/a	0.0019	0.03	n/a
Mercury (Hg)	253.7	n/a	n/a	n/a	40.0	0.15
Molybdenum(Mo)	313.3	n/a	0.021	n/a	0.14	n/a
Nickel (Ni)	232.0	0.008	n/a	0.012	0.065	n/a
Palladium (Pd)	247.6	0.03	n/a	0.018	0.04	n/a
Phosphorus (P)	213.6	n/a	10.0	n/a	n/a	n/a
Platinum (Pt)	265.9	0.12	n/a	0.22	0.04	n/a
Potassium (K)	766.5	0.0009	n/a	0.0041	0.40	n/a
Rhodium (Rh)	343.5	0.009	n/a	0.037	0.02	n/a
Rubidium (Rb)	780.0	0.003	n/a	0.005	n/a	n/a
Scandium (Sc)	391.2	n/a	0.02	n/a	n/a	n/a
Selenium (Se)	196.0	0.23	n/a	n/a	0.32	0.27
Silicon (Si)	251.6	n/a	0.30	n/a	17.0	n/a
Silver (Ag)	328.1	0.0032	n/a	0.0023	0.04	n/a
Sodium (Na)	589.0	0.0037	n/a	0.0086	n/a	n/a
Strontium (Sr)	460.7	n/a	0.005	n/a	0.01	n/a
Tantalum (Ta)	271.5	n/a	2.2	n/a	n/a	n/a
Tellurium (Te)	214.3	0.054	n/a	n/a	3.20	0.43
Thallium (Tl)	276.8	0.014	n/a	n/a	0.015	n/a
Tin (Sn)	224.6	n/a	0.21	n/a	15.0	1.39
Titanium (Ti)	365.4	n/a	0.05	n/a	0.5	n/a
Tungsten (W)	255.1	n/a	1.2	n/a	n/a	n/a
Vanadium (V)	318.5	n/a	0.11	n/a	0.03	n/a
Zinc (Zn)	213.9	0.0033	n/a	0.0037	0.08	n/a

AA500

ATOMIC ABSORPTION SPECTROMETER



NEW UPGRADE AVAILABLE
Full Automation for multi-element analysis



The AA500 Atomic Absorption Spectrometer is a high performance automated instrument designed to meet the requirements of the modern laboratory. Due to its versatility and performance it can be used for a wide range of applications including:

- Agricultural
- Clinical
- Environmental
- Food
- Metal
- Mining
- Geological
- Petrochemical
- Pharmaceutical

The versatile instrument is available in three configurations:

AA500F – The instrument is equipped with a flame atomiser only. The positioning of which is fully controlled by the embedded computer system and AA Win software.

Three flame options are available to the user with the Air/Acetylene being the standard configuration. This flame can be used for nearly all standard elements while the N2O/Acetylene and the Air/LPG (Natural gas) are available as an option for the more demanding of elements. All three flame configurations offer coded burner for full safety protection.

AA500G – The instrument is equipped with a Graphite Furnace Atomiser only. The graphite head is fixed into the optical path to maximise performance and eliminate drift.

The temperature of the transversely heated graphite tube is accurately controlled by means of a precision feedback system. Pyrolytically coated platform tubes are supplied as standard to improve the performance and eliminate many analytical problems associated with this technique.

AA500FG – The instrument is equipped with both Flame Atomiser and Graphite Atomiser as described above. Both configurations are installed into the instrument and can be changed over by a simple selection in the versatile AA Win software.

NOW GLP COMPLIANT

AA500 continued

FEATURES & FUNCTIONS

- Embedded PC system built into the instrument as standard on all configurations. Pre-installed AAWin3 software, user manuals, cook book and Windows operating system.
- AAWin3 software provides full control of the instrument and autosampler with easy method change for each technique. **Now GLP compliant.**
- Automatic 8 Hollow Cathode lamp turret controlled and optimised by the AAWin3 software. Operating lamp current and warm-up lamp current can be individually controlled to eliminate drift commonly associated with lamp warming.
- D2 lamp background correction system fitted as standard to all configurations. High energy D2 lamp and adjustable beam splitter mirror are optimised by the AAWin3 software.
- Self Reversal background correction system fitted as standard to all configurations. The high performance background system uses the same hollow cathode lamp as installed for the analysis. Minimum extra components are required and optical alignment is very simple. Self Reversal can be used for any element at any wavelength making it extremely versatile.
- High precision minimal optics ensures maximum light throughput to the computer controlled Czerny-Turner monochromator.
- A universal autosampler is available as an optional accessory which is conveniently mounted on the front of the AA500 instrument.
- Optional XYZ autosampler provides appropriate sample volume for multi element analysis, along with scalable sample capacity for high sample throughput.
- Absorption and Emission modes are standard features in the AAWin3 software as well as peak height, peak area, sequential and manual integration modes.

FLAME ATOMISER FEATURES

The flame atomiser offers three flame options: Air/acetylene is the standard configuration with the N2O/acetylene and Air/LPG as options.

Air/Acetylene

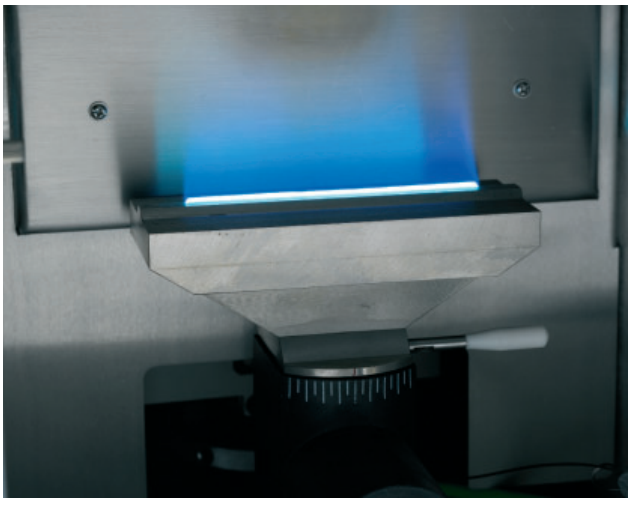
- The Air/Acetylene flame uses a 100mm single slot burner for the standard configuration.
- The high sensitivity (Cu 2ppm >0.280abs) is due to the inert adjustable nebuliser fitted as standard. An acid resistant replacement is available with a Pt/Ir capillary.
- The flame can be easily set from blue lean flame through stoichiometric to fuel rich by means of computer control.

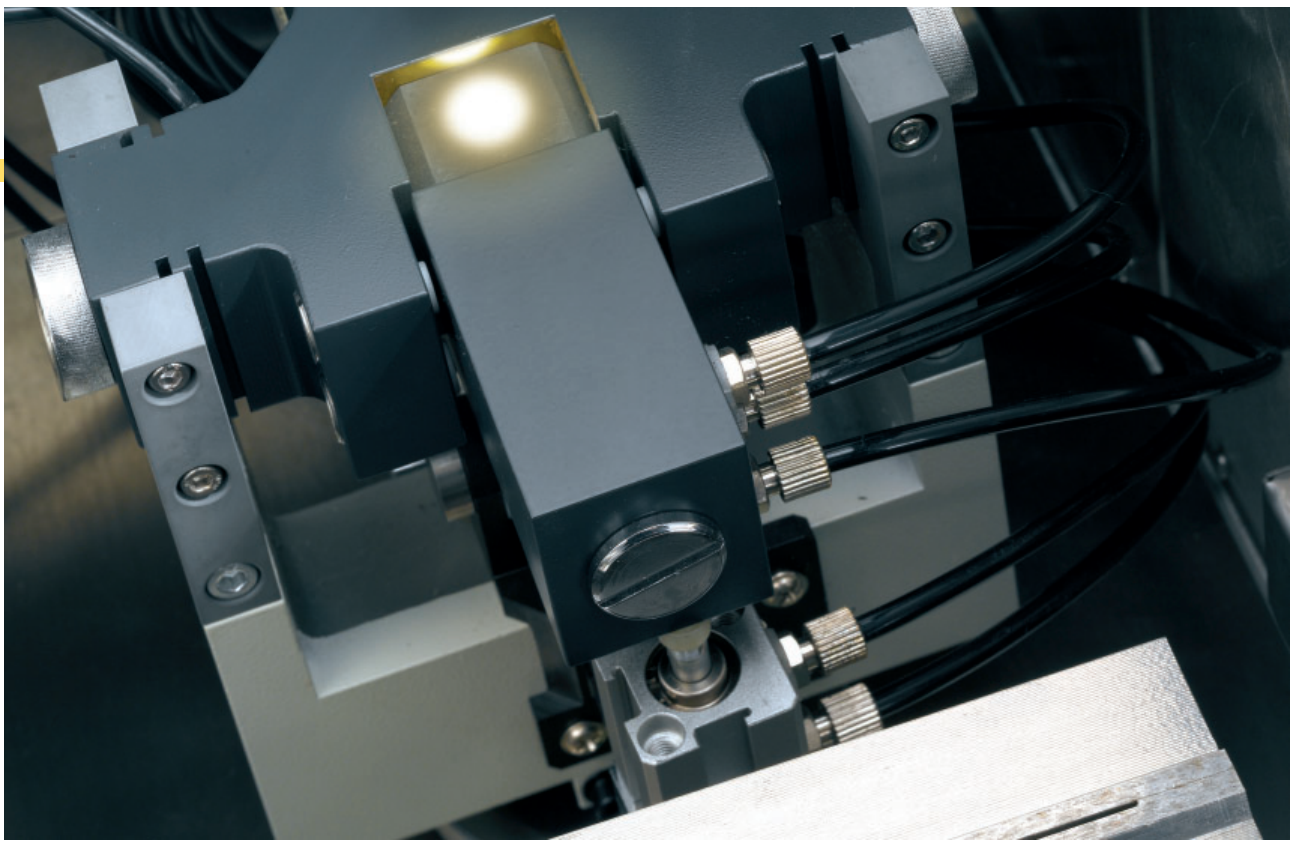
N20/Acetylene

- The N2O/Acetylene flame uses a 50mm single slot burner and is available as an optional extra.
- This flame configuration is used to measure elements less prone to ionization such as: Aluminium, Tin, Titanium, Calcium, Vanadium and Molybdenum.
- Switching from Air/Acetylene to N2O/Acetylene to Flame Off is fully controlled by the AAWinPro software.

Air/Propane (LPG)

- This flame uses a 3 slot burner and with the low pressure requirement it is also much safer to operate.
- Due to the low temperature of the flame it is ideal for analysing alkali metals such as: Potassium, Sodium and Lithium, especially when used in the emission mode.
- Some remote areas of the world have difficulty obtaining Acetylene gas of a high enough purity to operate the flame correctly, LPG can give a real alternative and offer comparable results for most elements throughout the wavelength range.





Safety Features

- Pressure monitoring for all gases
- Burner Identification
- Flame sensor
- Drain Trap level Sensor
- Gas Leak Detector
- Over Pressure in Premix
- Safety Cut off Switch

GRAPHITE ATOMISER FEATURES

The integrated Graphite Furnace Atomiser is available in two instrument configurations.

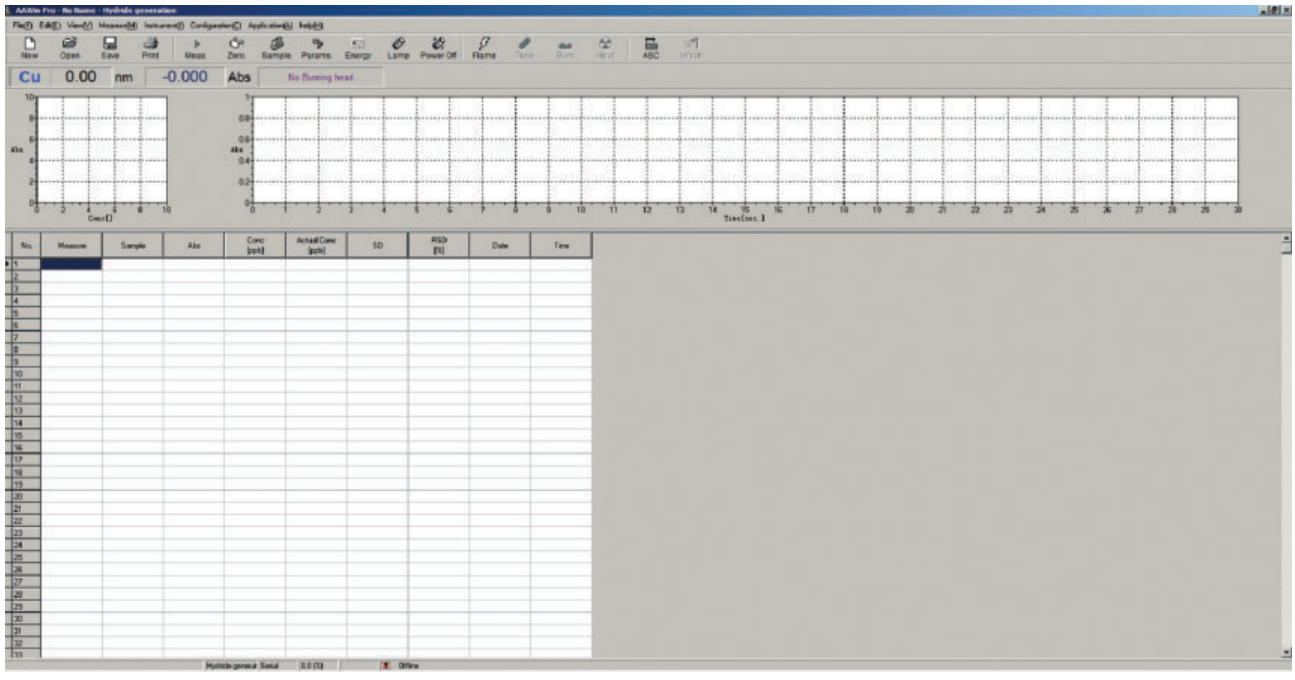
- In the AA500G instrument the graphite furnace head is fixed into the light path so alignment with the optical path is simple and accurate.
- In the AA500FG instrument the graphite furnace head is fixed behind the flame atomiser assembly and is motorised into position by a simple operation in the AAWinPro software. The positions for the flame and graphite are saved making it easy to swap between modes for different analysis.
- The temperature of the transversely heated graphite tube is accurately controlled by means of a precision feedback system and has been designed to reduce analytical problems normally associated with this type of technique.
- Pyrolytically coated graphite tubes are used as standard and are manufactured to improve performance as well as increase the analytical life.
- Platform graphite tubes are supplied as standard and will accept volumes up to 20µl. Non-platform graphite tubes are also available as an optional extra.
- Up to 10 heat stages are available for the programming of the graphite atomiser. These can be set and stored within the AAWinPro software.
- The graphite tube is held in position by means of a gas piston. Replacement of the graphite tube is performed by a simple command in the AAWin Software.
- The graphite tube is efficiently cooled by an additional water circulation system (supplied separately).

Safety Features

- Argon Gas pressure Sensor
- Water flow sensor
- Over Temperature Sensor
- Broken graphite tube protection

AAWin3 Software

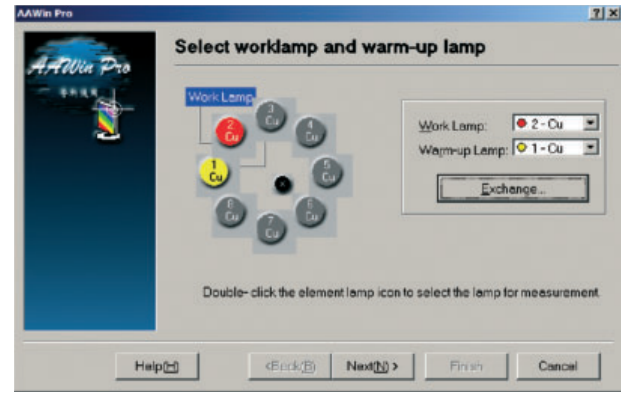
AAWin3 Software is a powerful and intuitive software product designed to allow control and data acquisition from the PG Instruments AA500 series Atomic Absorption Spectrometer.

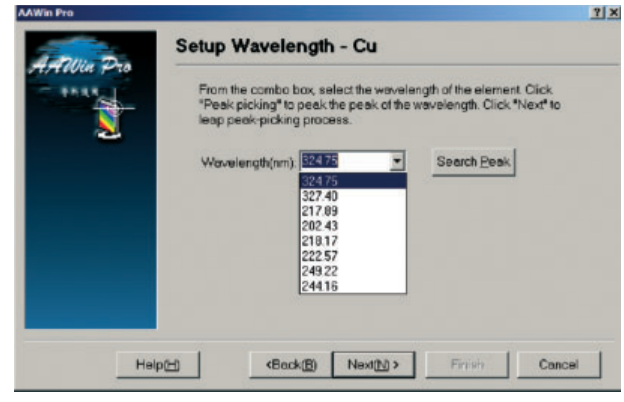


The **AAWin3** software allows the Analyst to control all aspects of their analytical method whilst providing an extensive range of tools for data collection, storage and interpretation.

The software interface consists of three key work-areas, whilst having toolbars to access many others. These work areas allow the user to view real-time signal acquisition, up-to-date display of calibration curves and a flexible, sample table.

The **AAWin3** software offers full automation allowing the user to measure multiple elements sequentially by means of a Sample Wizard and optional random access autosampler.

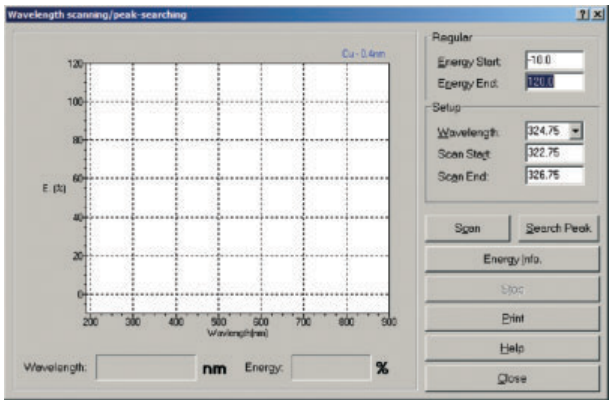




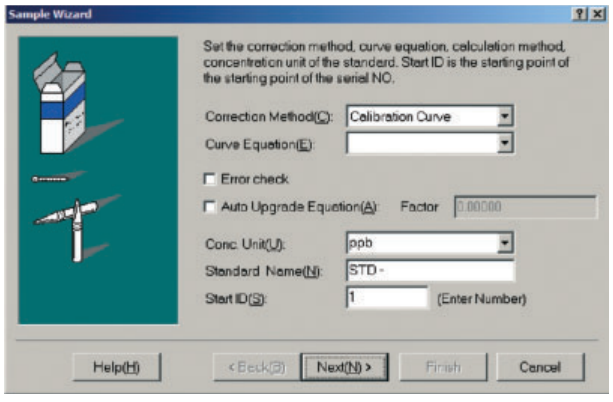
Lamp turret setup, operating and warm-up currents, along with the desired analytical wavelength are easily selected in the configuration.

NOW GLP COMPLIANT

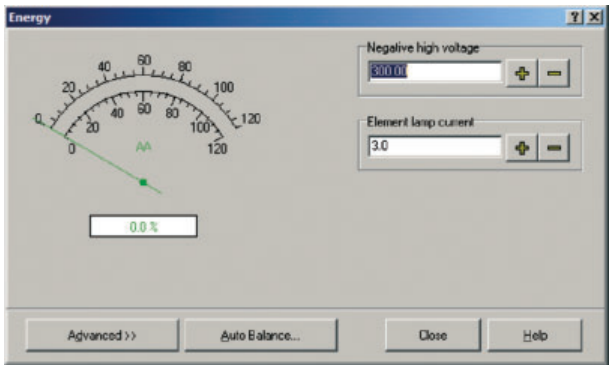
Full Automation for Multi-Element Analysis



Ensure optimal peak position at the chosen analytical line by scanning the emissions spectra.

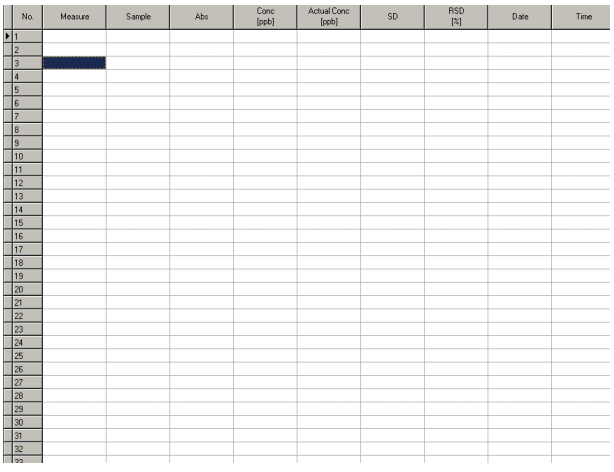


Each stage of analysis setup is made quick and simple by means of the Sample Wizard.



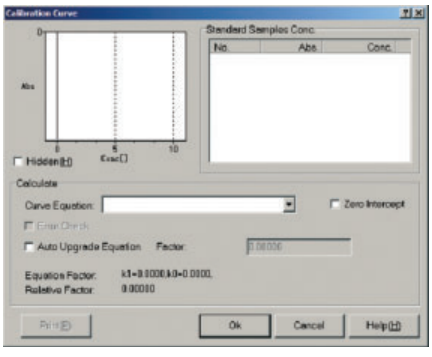
Obtain reliable and accurate results by using the Energy control feature to manually optimise atomiser position and setup.

Use the Auto-balance feature to ensure energy level, and optical alignments are optimised when using background correction.



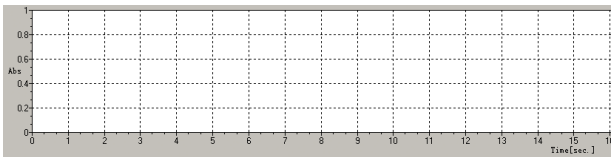
Use the sample table to perform quick measurements of both Standards and Samples.

Easily append the sample table to add new samples or even revise calibration curves either by manual introduction or using an Autosampler.



View up-to-date calibration curves in 1st, 2nd, or 3rd order using a standard calibration or standard addition.

Perform retrospective curve fits to ensure optimum correlation.



View real-time signal acquisition for flame, graphite furnace and hydride generation analysis.

Specifications

Spectrometer System	
Wavelength range	185nm - 910nm
Light Source	Hollow cathode lamp (HCL), Deuterium Arc lamp (D2)
Modulation	Square Wave Pulse
Modulation frequency	100hz Self reversal (SR) background, 400hz Deuterium Arc (D2) background
Monochromator	
Grating	1800 grooves/mm diffraction grating
Blazed Wavelength	250nm
Focus	300nm
Bandwidth	0.1nm, 0.2nm, 0.4nm, 1.0nm, 2.0nm (Software selectable)
Scan mode	Automatic
Photometric Type	Single Beam
Wavelength Accuracy	+/-0.15nm
Wavelength Resolution	0.2nm +/-0.02nm
Wavelength Reproducibility	< 0.05nm
Baseline Stability	0.005Abs/30min
Background Correction	Deuterium Arc (D2) 1.0Abs, Self Reversal (SR) 3.0Abs
Flame Analysis	
Flame Types	Air/Acetylene, Nitrous Oxide/Acetylene, Air/Propane (LPG)
Sensitivity (Cu)	2µg/ml Absorption >0.280Abs
Characteristic Concentration	Cu < 0.02µg/ml, Ba < 0.15µg/ml (N2O/Acetylene)
Detection Limit	Cu < 0.004µg/ml
Repeatability	Cu < 0.7% (Air/Acetylene Flame) Ba < 1.0% (Nitrous Oxide/Acetylene Flame)
Burner heads	Titanium Alloy
Nebuliser	Inert Adjustable Nebuliser, Flow Rate from 2ml - 6ml/min. Pt/Ir capillary available for high acid concentration
Pre-mix Chamber	Corrosion Resistant
Atomiser Selection	Automatic changeover (AA500FG), Manual (AA500F)
Safety Features	Burner identification, Flame Sensor, Gas Leak Sensor, Low Gas Pressure Sensor, Drain Trap Sensor, Power Loss Protection
Graphite Furnace Analysis	
Graphite Head	Transversally Heated
Temperature Range	Ambient – 2650C
Heating Program	Up to 10 steps. Drying, Ashing, Atomisation, Cleaning
Feedback	Voltage and Optical Temperature Control Feedback
Sensitivity (Cu)	50ng/ml Absorption > 0.40Abs
Detection Limit	Cd < 0.004ng/ml
Repeatability	Cu < 2.0%, Cd < 2.0%
Graphite Tubes	Pyrolytically Coated with Platform
Sample Size	Up to 20µl
Graphite Cooling	Water Circulator Available
Safety Features	Argon Pressure Sensor, Water Flow Sensor, Over Temperature Sensor, Broken Tube Protection

Specifications

Spectrometer System	
Data Processing	
PC System	Embedded PC, Windows Professional Operating System
Operating Program	AA Win Pro software
Analytical Methods	Flame AA, Flame AE, Graphite Furnace, Hydride Generation
Readout Mode	Continuous, Manual, Peak Height, Peak Area
Calibrations	Multi-Standard Calibration, Standard Addition, Interpolation
Data Storage	Analytical results, instrument and measurement parameters, signal profile, calibration curve
Power Requirements	
Main Unit	110/230Vac 50/60hz 200W
Graphite Power Supply	220Vac 50/60hz Instantaneous power 5KW Current rating??
Dimensions	
Main unit	110cm x 54cm x 54cm 75Kg
Graphite Power Supply	50cm x 54cm x 54cm 70Kg

Standard packaging

AA500F	
1	Main unit
1	AA500F instruction Manual
1	Cook Book
1	Safety Manual
1	System validation document
1	Data coded Air/Acetylene burner
1	Inert adjustable Nebuliser
8	Hollow cathode Lamp Holders
1	Monitor
1	Keyboard and Mouse
1	Low Voltage power Supply
2	Power Cables
1	Gas tubing Air
1	Gas Tubing Acetylene
1	Drain Trap and Tubing
1	Tool Kit
1	Various gas Fittings

AA500G	
1	Main unit
1	AA500G instruction Manual
1	Cook book
1	Safety Manual
1	System Validation document
8	Hollow cathode Lamp Holders
1	Monitor
1	Keyboard and Mouse
1	Low Voltage Power Supply
2	Power Cables
1	Tool Kit
1	Various Gas Fittings
10	Graphite Tubes
1	Gas Tubing Argon
1	Connection Cable (Graphite)
1	Pipette
1bag	Pipette Tips

AA500FG	
1	Main unit
1	AA500F instruction Manual
1	Cook Book
1	Safety Manual
1	System validation document
1	Data coded Air/Acetylene burner
1	Inert adjustable Nebuliser
8	Hollow cathode Lamp Holders
1	Monitor
1	Keyboard and Mouse
1	Low Voltage power Supply
2	Power Cables
1	Gas tubing Air
1	Gas Tubing Acetylene
1	Drain Trap and Tubing
1	Tool Kit
1	Various gas Fittings
10	Graphite tubes
1	Gas Tubing Argon
1	Connection Cable (graphite)
1	Pipette
1bag	Pipette Tips

Accessories

Autosampler (500-004)

The AS500 Autosampler is an accessory specifically designed for the AA500 Atomic Absorption Spectrometer. The AS500 can be used to automatically introduce standard and unknown samples to the atomiser for analysis. It can be used with both flame and graphite furnace instruments.

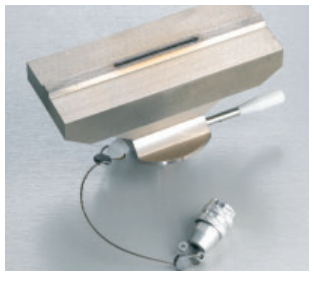
Flame Analysis

- 38 sample positions (6 for standard samples, 32 for unknown samples).
- Sample vial size 6ml
- Standard sample vial size 12ml
- Pressure protection for wash
- Position adjustment by AA Win software
- Reproducibility Cu < 0.6% (air/acetylene) Cu< 1.0% (air/LPG) Ba <1.0% (nitrous oxide/acetylene)

Graphite Analysis

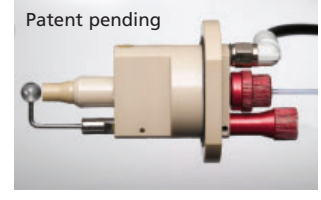
- 76 sample positions (10 for standard samples, 6 for modifier solutions, 60 for unknown samples)
- Sample vial size 1.5ml
- Modifier vial size 12ml
- Pressure protection for wash
- Up to 3 modifier additions
- Position adjustments by AA-Win Pro software
- Reproducibility Cu <2.0%, Cd <2.0%

Nitrous Oxide/Acetylene Burner (500-023)



- Titanium alloy construction
- 50mm single slot
- Coded for safety
- Direct replacement for standard burner
- Designed for higher temperature flame
- Adjustment of burner rotation for sensitivity optimisation

Inert Adjustable Nebuliser (500-011)



- Acid resistant nebuliser with Pt/Ir capillary(500-012)
- Adjustable uptake from 2-6ml/min
- Fully adjustable impact bead
- Excellent RSD's typically <1.0%
- Typical read back values better than 2%
- Enhanced sensitivity
- Can be used on all PG Instruments AA500 and AA990 series atomic absorption systems
- Redesigned spray chamber to ensure excellent drainage properties

Air/Propane (LPG) Burner (500-030)

- Titanium Alloy construction
- 3 slot burner
- Coded for safety
- Direct replacement for standard burner
- Designed for lower temperature flame
- Adjustment of burner rotation for sensitivity optimisation

XYZ Autosampler

- High Sample Volume for multi-element analysis
- Scalable Sample capacity for high sample throughput

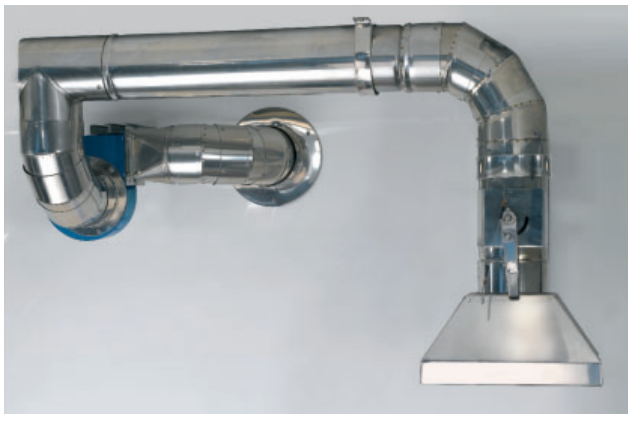
Hydride Unit (500-007)

- Universal design
- Full reaction cycle from press of start button
- Supplied with temperature controlled heated absorption cell
- Cell is easily installed with burner attachment
- Can be used for Mercury cold vapour analysis
- Sensitivity for most elements <1ng/ml
- Only 2.0ml – 2.5ml per sample required
- RSD < 3%
- Quick analysis < 30 seconds per measurement

Air Compressor (GS-003)

- Ultra low noise when running – just 53-59dB (A)
- 100% Oil Free Design
- Efficient, Horizontal Twin pump unit
- Innovative Compact Design, perfect for limited space
- 10 bar Maximum pressure
- 15 Litre tank for stable air supply
- 104L/min supply at 3 bar
- Easy to ship only 14Kg

Fume Extraction System



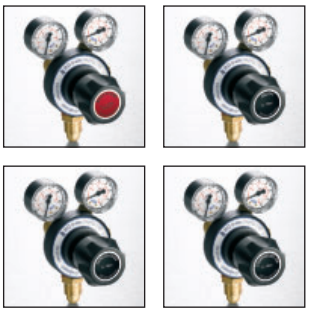
- Universal fitting
- Stainless steel construction
- All fittings supplied
- 150mm polymer fan
- 240Vac 50/60hz
- 300mm diameter hood, adjustable height
- Adjustable bends from 0° to 90°

Water Circulator (GS-005)

For use with AA500G / AA500FG

- Re-circulating water cooler
- 2Kw cooling capacity
- 230v, 270 watts power (110v available, please call for details.)
- Rust free 5 Litre Water Capacity
- 2 Litre per minute flow rate
- Forced air cooling system
- 2x Male quick connection points 2x Female quick fittings supplied
- Dimensions (LWH) 250 x 245 x 700 mm
- Tubing and additional connectors optional

Gas Regulators (GS-001, GS-002, GS-006, GS-007)



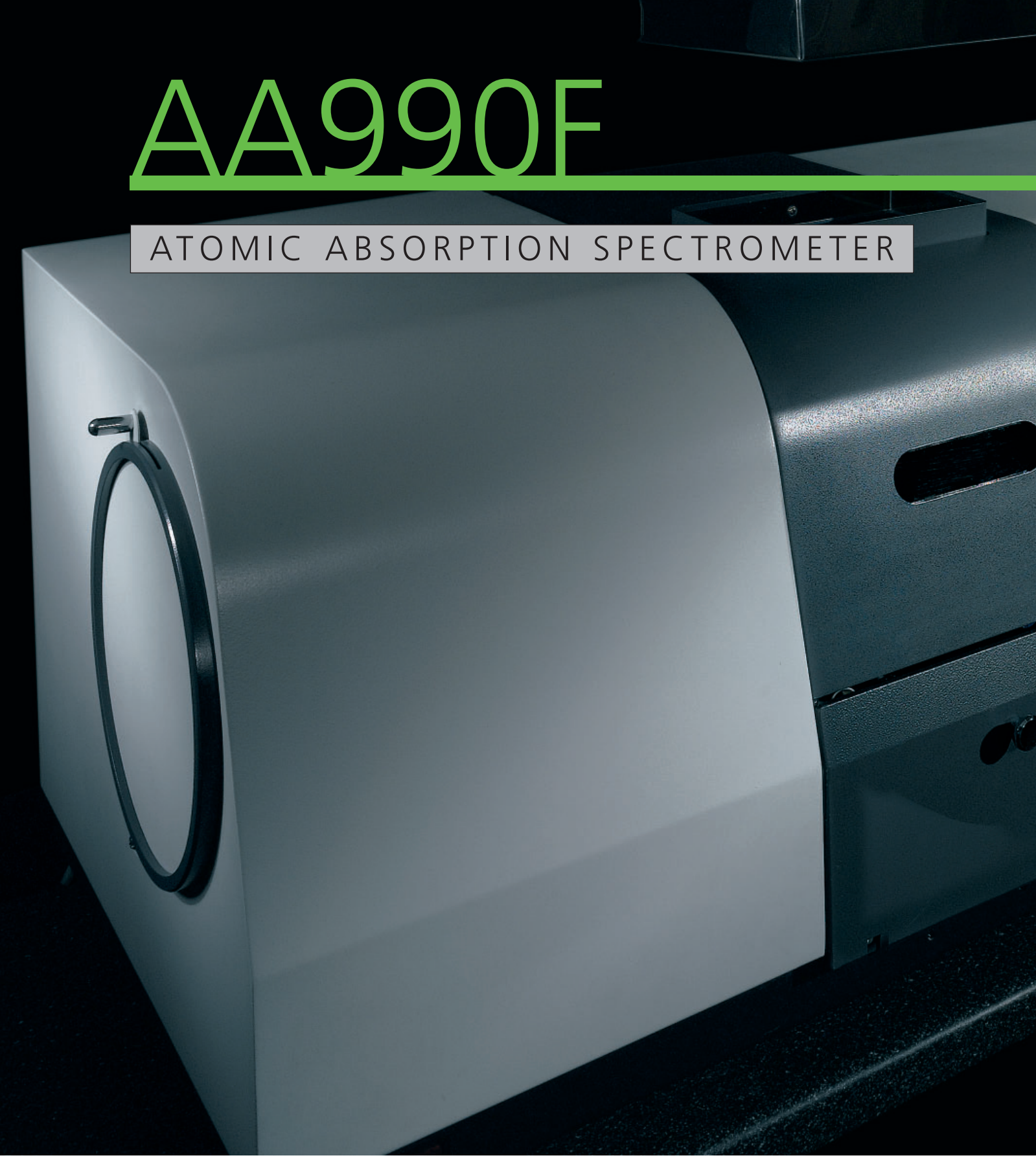
- Direct fitting to gas cylinder
- Comply to British Standards
- Supplied with hose fitting and crimp
- Various gas cylinder fittings available
- Regulators for Air, Acetylene, Argon, LPG
- Specify fitment to European standard

Acetylene Flame Arrestor (GS-004)

- Direct fitting to gas regulator output
- Required for acetylene gas
- Non-resetting easy to replace

AA990F

ATOMIC ABSORPTION SPECTROMETER



The PG990 Atomic Absorption Spectrophotometer is a versatile entry level instrument with a computer controlled Air/Acetylene flame for general laboratory requirements. Due to its high sensitivity and excellent performance the instrument can be used for a wide range of applications including:

- Agricultural
- Clinical
- Environmental
- Food
- Metal
- Mining
- Geological
- Petrochemical
- Pharmaceutical

FEATURES & FUNCTIONS

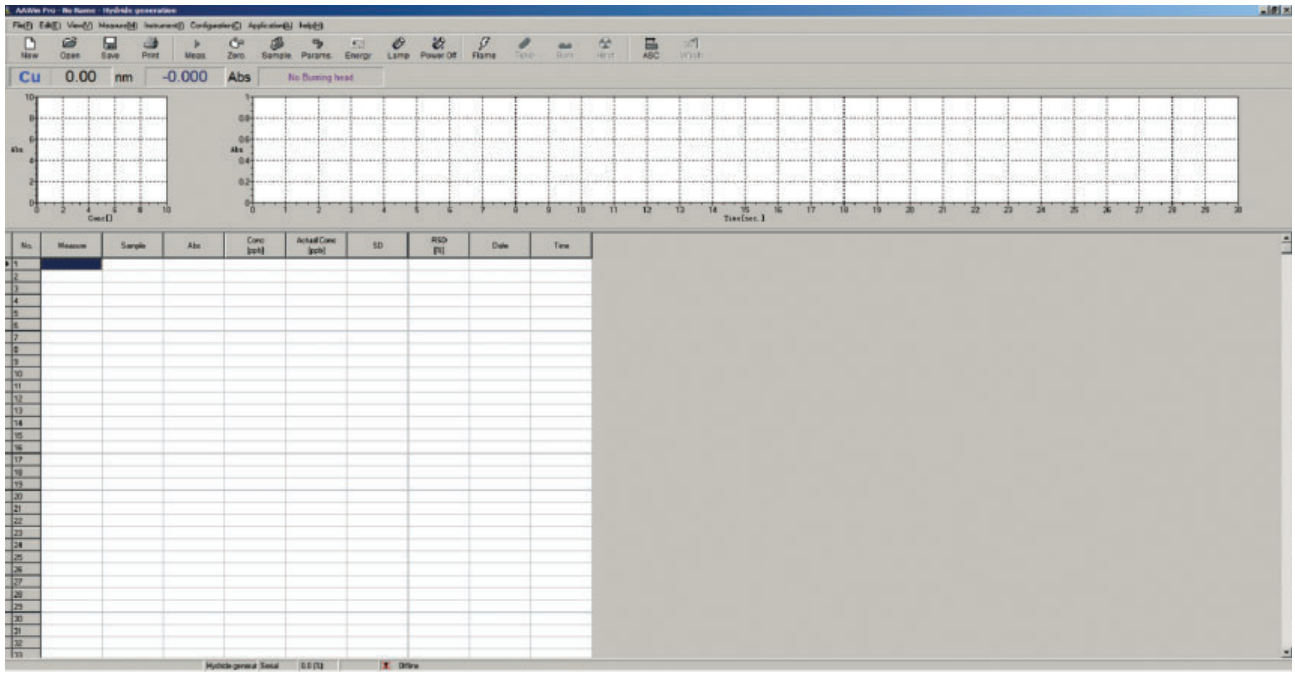
- The instrument has a motorised 8 hollow cathode lamp turret which allows the automatic positioning and optimisation of each hollow cathode lamp by the software.
- The control of the gas flows for the fuel gas (C2H2) of the burner is also carried out directly from the software thus allowing optimisation of the instrument for the best analytical parameters for a selected analysis.
- Two methods of background correction are available. The first utilises a Deuterium Arc lamp and the second is the proven method of Self Reversal.
- High precision minimal optics ensures maximum light throughput to the computer controlled Czerny-Turner Monochromator.
- The location of the wavelength and peak selection is automatically controlled from the software.
- The spectral bandwidth is automated and is available with a choice of five slit sizes.
- The electronic parameters for the photomultiplier tube detector, the hollow cathode lamp current and the balancing of the absorbance and background energies are controlled from the software.
- The ignition of the flame is computer controlled and the various safety interlocks offer a very safe operating system.

SAFETY

- The flame conditions are continuously monitored and should the flow rates change, an audible alarm sounds.
- The pressure of the support gas (oxidant) is monitored constantly. If the pressure changes then the flow of the fuel gas will be stopped and the flame will be safely extinguished.
- A sensor monitors the level of liquid in the drain and will prevent ignition if too low. The flame will also be extinguished if the level of liquid in the drain changes significantly.
- A flame sensor monitors the flame and safely turns off the gas flow to the burner if the flame suddenly extinguishes.
- The burner is identified by a switch making it impossible to light without the burner being fitted.
- An emergency flame off button is installed in case a problem is observed. The flame can be extinguished safely.

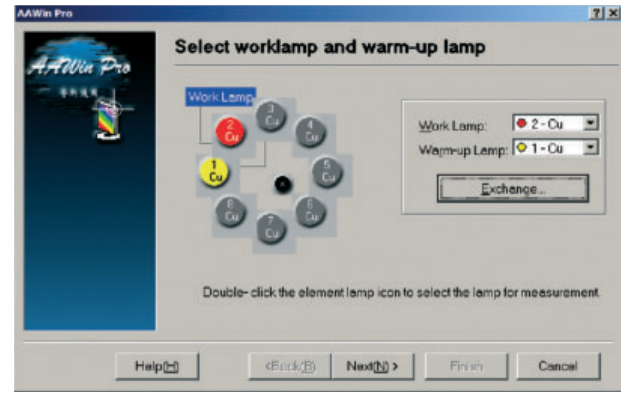
AAWin2 Software

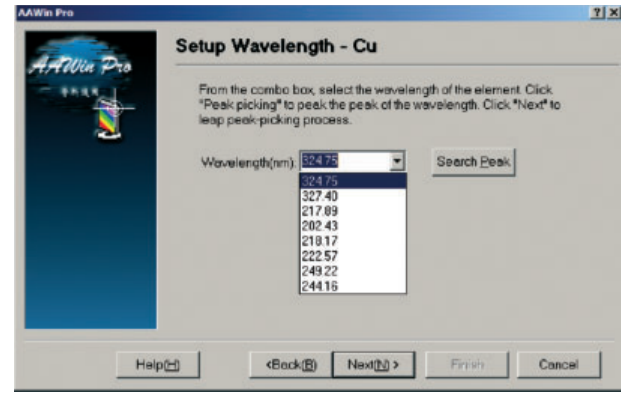
AAWin2 Software is a powerful and intuitive software product designed to allow control and data acquisition from the PG Instruments PG990 Atomic Absorption Spectrometer.



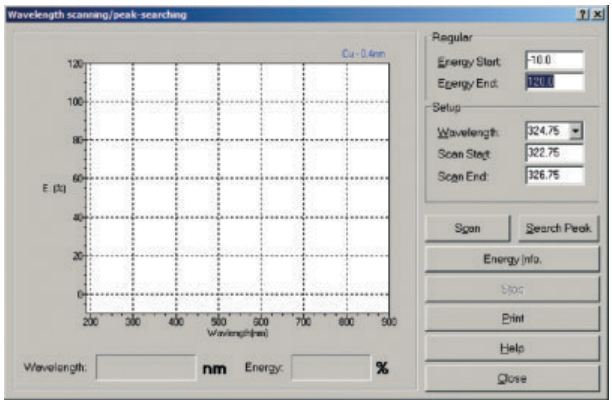
The **AAWin2** software allows the Analyst to control all aspects of their analytical method whilst providing an extensive range of tools for data collection, storage and interpretation.

The software interface consists of three key work-areas, whilst having toolbars to access many others. These work areas allow the user to view real-time signal acquisition, up-to-date display of calibration curves and a flexible, sample table.

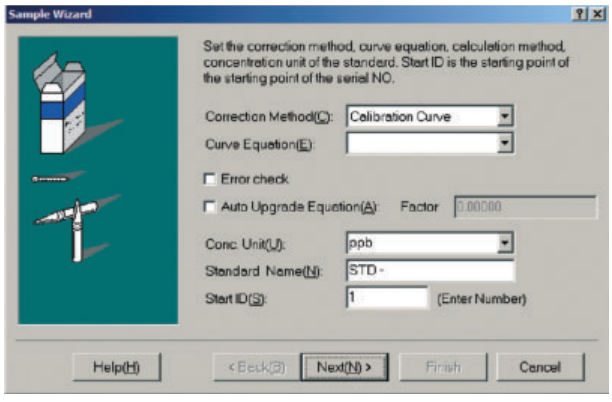




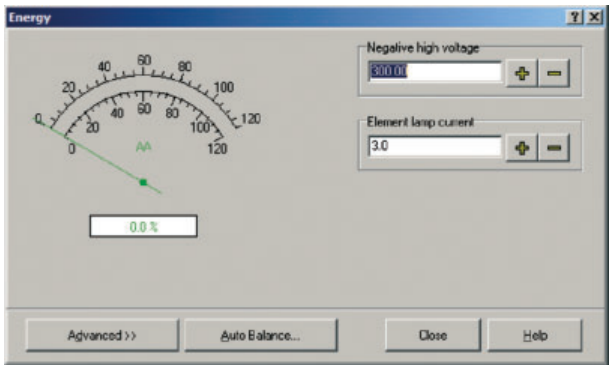
Lamp turret setup, operating and warm-up currents, along with the desired analytical wavelength are easily selected in the configuration.



Ensure optimal peak position at the chosen analytical line by scanning the emissions spectra.

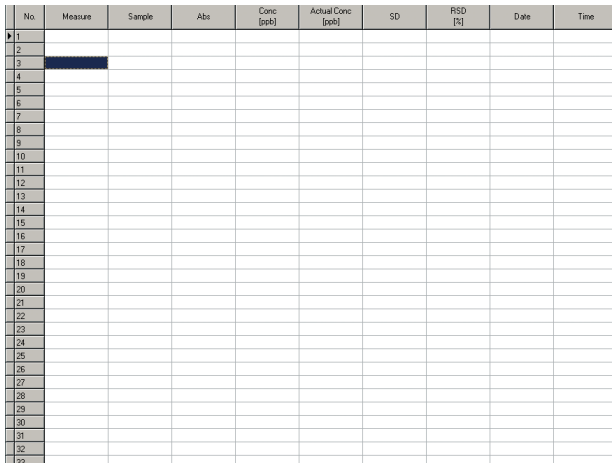


Each stage of analysis setup is made quick and simple by means of the Sample Wizard.



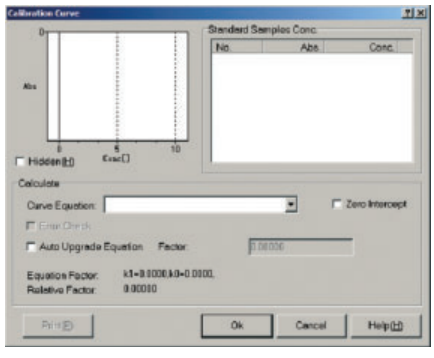
Obtain reliable and accurate results by using the Energy control feature to manually optimise atomiser position and setup.

Use the Auto-balance feature to ensure energy level.



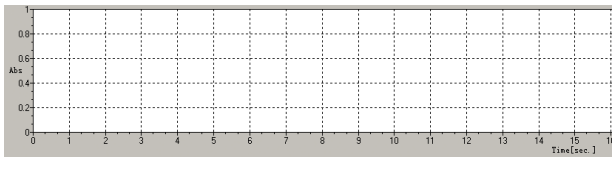
Use the sample table to perform quick measurements of both Standards and Samples.

Easily append the sample table to add new samples or even revise calibration curves either by manual introduction or using an Autosampler.



View up-to-date calibration curves in 1st, 2nd, or 3rd order using a standard calibration or standard addition.

Perform retrospective curve fits to ensure optimum correlation.



View real-time signal acquisition for flame and hydride generation analysis.

Specifications

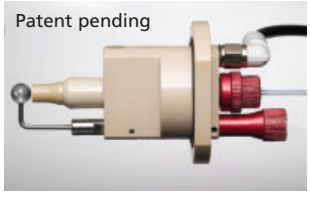
Spectrometer system	
Wavelength range	190nm - 900nm
Light Source	Hollow cathode lamp (HCL), Deuterium Arc lamp (D2)
Modulation	Square Wave Pulse
Modulation frequency	100hz Self reversal (SR) background, 400hz Deuterium Arc (D2) background
Monochromator	
Grating	1800 grooves/mm diffraction grating
Blazed Wavelength	250nm
Focus	300nm
Bandwidth	0.1nm, 0.2nm, 0.4nm, 1.0nm, 2.0nm (Software selectable)
Scan mode	Automatic
Photometric Type	Single Beam
Wavelength Accuracy	+/-0.15nm
Wavelength Resolution	0.2nm +/-0.02nm
Wavelength Reproducibility	< 0.05nm
Baseline Stability	0.005Abs/30min
Background Correction	Deuterium Arc (D2) 1.0Abs, Self Reversal (SR) 3.0Abs
Flame Analysis	
Flame Type	Air/Acetylene
Sensitivity (Cu)	2ug/ml Absorption >0.28Abs
Characteristic Concentration	Cu < 0.02ug/ml
Detection Limit	Cu < 0.004ug/ml
Repeatability	Cu < 0.7%
Burner head	Titanium Alloy
Nebuliser	Inert Adjustable Nebuliser, Flow Rate from 2ml - 6ml/min. Pt/Ir capillary available for high acid concentration
Pre-mix Chamber	Corrosion Resistant
Safety Functions	Burner switch, Flame Sensor, Gas Leak Sensor, Low Gas Pressure Sensor, Drain Trap Sensor, Power Loss Protection
Data Processing	
Operating Program	AA Win software
Analytical Methods	Flame AA, Flame AE, Hydride
Readout Mode	Continuous, Manual, Peak Height, Peak Area
Calibrations	Multi-Standard Calibration, Standard Addition, Interpolation
Data Storage	Analytical results, Instrument and measurement parameters, Signal profile, Calibration curve
Power Requirements	220Vac 50/60hz 200W
Dimensions	110cm x 54cm x 54cm 75Kg

Standard packaging

1	Main Unit	1	Air/Acetylene Burner	1	Gas Tubing Acetylene
1	PG990 Instruction Manual	1	Inert Adjustable Nebuliser	1	Drain Trap and Tubing
1	Cook Book	8	Hollow Cathode Lamp Holders	1	Tool Kit
1	Safety Manual	1	Power Cable	1	Various Gas Fittings
1	System Validation Document	1	Gas Tubing Air		

Accessories

Inert Adjustable Nebuliser (500-011)



- Acid resistant nebuliser with Pt/Ir capillary (500-012)
- Adjustable uptake from 2-6ml/min
- Fully adjustable impact bead
- Excellent RSD's typically <1.0%
- Typical read back values better than 2%
- Enhanced sensitivity
- Can be used on all PG Instruments AA500 and AA990 series atomic absorption systems
- Redesigned spray chamber to ensure excellent drainage properties

Hydride Unit (990-007)

- Universal design
- Full reaction cycle from press of start button
- Supplied with temperature controlled heated absorption cell
- Cell is easily installed with burner attachment
- Can be used for Mercury cold vapour analysis
- Sensitivity for most elements <1ng/ml
- Only 2.0ml – 2.5ml per sample required
- RSD < 3%
- Quick analysis < 30 seconds per measurement

Flame Autosampler

- Sequential auto-sampler allows the automated analysis of 50 or more samples and calibration standards.
- The system allows for automatic update of standard values and curve parameters by using up to 8 standards, blanks and QC standards.
- A double wash station for probe wash avoids sample and standard contamination.
- An inert Teflon probe is supplied as standard.

Air Compressor (GS-003)

- Ultra low noise when running – just 53-59dB (A)
- 100% Oil Free Design
- Efficient, Horizontal Twin pump unit
- Innovative Compact Design, perfect for limited space
- 10 bar Maximum pressure
- 15 Litre tank for stable air supply
- 104L/min supply at 3 bar
- Easy to ship only 14Kg

Fume Extraction System

- Universal fitting
- Stainless steel construction
- All fittings supplied
- 150mm polymer fan
- 240Vac 50/60hz
- 300mm diameter hood, adjustable height
- Adjustable bends from 0° to 90°

Acetylene Regulator (GS-001)

- Direct fitting to gas cylinder
- Comply to British Standards
- Supplied with hose fitting and crimp
- Various gas cylinder fittings available
- Specify fitment to European standard

Acetylene Flame Arrestor (GS-004)

- Direct fitting to gas regulator output
- Required for acetylene gas
- Non-resetting easy to replace

Atomic Absorption Spectrometer Qualification Kit

The purpose of the Qualification Kit is to offer both laboratory analysts and regional distributors the flexibility to perform a full installation and operational qualification on Atomic Absorption Spectrometers manufactured by PG Instruments.

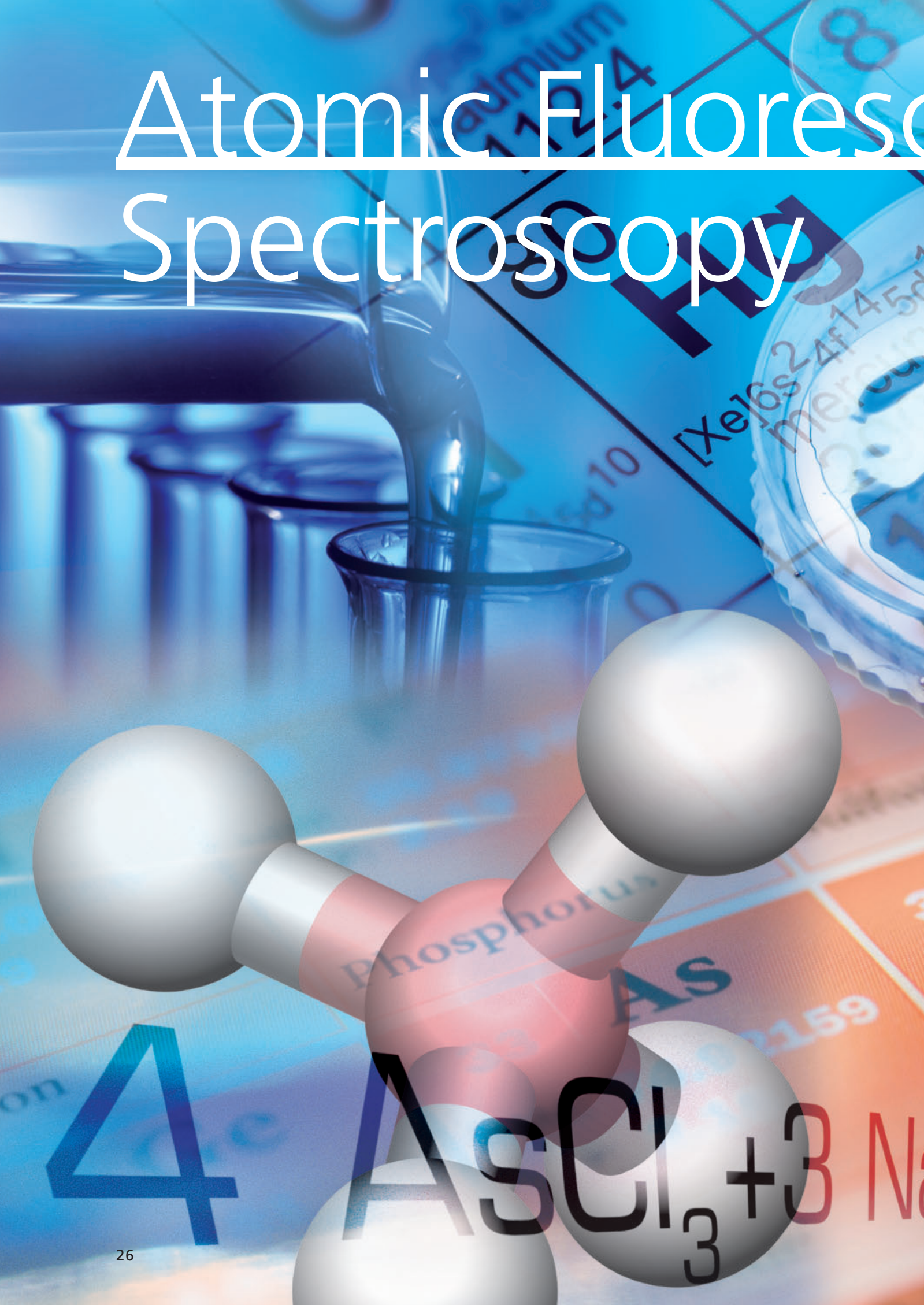
The work instructions within the qualification work book have been developed with considerations of the requirements of the Pharmacopoeia to ensure compliance with good laboratory practice.

The documentation supplied with the kit, guides the user through the qualification as it offers detailed instructions on how to carry out the tests, document and record results and perform any necessary corrective action. The comprehensive kit offers all the materials required to complete the qualification.

The contents of the kit are as follows:

- Qualified Hg Hollow Cathode Lamp – For determining the wavelength accuracy.
- Qualified Cu Hollow Cathode Lamp – For determining the flame and graphite analytical tests.
- Qualified Standard Solution – For determining the flame analytical tests.
- Qualified Standard Solution – For determining the graphite analytical tests.
- Filter Tool – For determining the photometric accuracy.
- Certificates for Solutions.
- Qualification Workbook.
- USB Flash Drive containing qualification workbook and qualification worksheets.

Atomic Fluoresc
Spectroscopy



The AFS technique is widely used for the determination of hydride forming elements and Mercury analysis. The technique provides an alternative to the conventional method of connecting a hydride generator to an Atomic Absorption Spectrophotometer (AAS). Due to the high intensity Hollow Cathode lamp source and low baseline noise offered by this technique, the usable sensitivity is greatly improved offering very low detection limits.

The AFS instrument fulfils the analysis by means of simultaneous detection, accurate sample introduction and stable furnace temperature control complementing the more widely used AAS flame/graphite systems.

The Atomic Fluorescence Spectroscopy technique is used to measure samples containing both hydride forming elements and mercury in a variety of analytical sectors. Due to its design and functionality, the instrument offers enhanced sensitivity, reduced interference and excellent limits of detection (ppt).

AF402

SIMULTANEOUS ATOMIC FLUORESCENCE SPECTROMETER

The AF402 is an ideal instrument for elemental analysis in various market and research industries including:

- Agricultural
- Public Health
- Pharmaceutical
- Metallurgical
- Food and Beverage
- Clinical
- Geological
- Petrochemical

STANDARD FEATURES

Light Source

- High Intensity Hollow Cathode lamps for greater intensity and stability.
- Up to three lamps can be installed for simultaneous analysis.
- All lamps are uniquely data coded offering important information to the PF Win operating software.

Optical System

- Shielded optical design greatly reduces light interference.
- Enhanced signal to noise ratio for increased analytical sensitivity.
- Unique optical configuration for increased fluorescence intensity. Up to twice the fluorescence intensity found in traditional AFS systems.
- High Quantum Solar Blind Photomultiplier Tube fitted as standard to ensure optimum stability.

Atomiser System

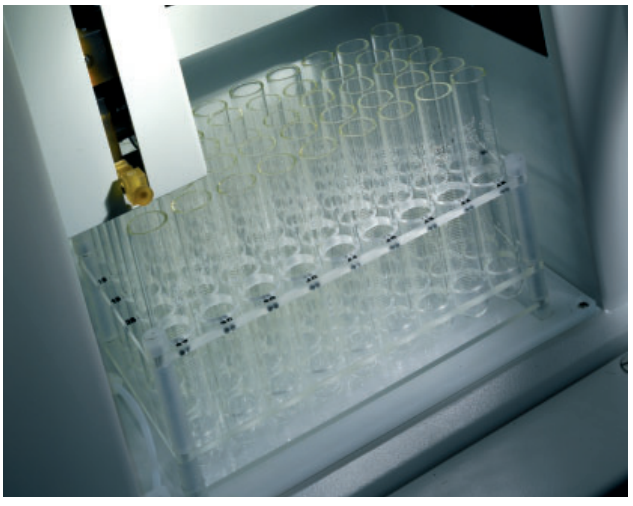
- High precision quartz atomiser tube designed for optimum performance, durability and long life.
- Self-igniting Argon/ Hydrogen flame with software controlled heater coil.
- Adjustable height control for improved optimisation.
- Integrated fume exhaust system to decontaminate pollution.

AF402 continued

Hydride generator

- Built in Hydride generator with continuous flow.
- Multi-pump with individual pressure adjustment for uptake control of reagents and carrier liquids.
- Introduction of sample using motorised syringe drive and unique three way control valve. Software controlled for greater accuracy.
- High efficiency glass liquid separator which optimises the separation minimising pressure fluctuations and improving measurement precision.

- Reagent compartment stores reagents safely and cleanly. Storage for up to four containers.
- Low level reagent monitoring.
- Embedded PC system built into the instrument as standard. Pre-installed PFWin software, user manual and windows operational system.



Autosampler

- Integrated autosampler.
- XYZ configuration.
- 2 x 45 vial trays for automated sample introduction.
- Auto dilution using motorised syringe drive and selection valve.
- Full calibration using only one stock standard solution.
- Fully controlled by the PF Win software.

Electronic Control System

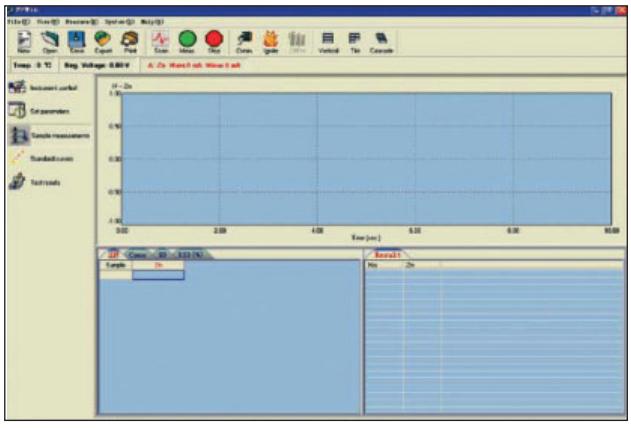
- High technology electronics and PCB components.
- Rear mounted and separated electronic section to eliminate carry over from hydride technique.
- Built in embedded PC operating system. No extra PC control required.
- Windows operating software.
- PFWin instrument control software.

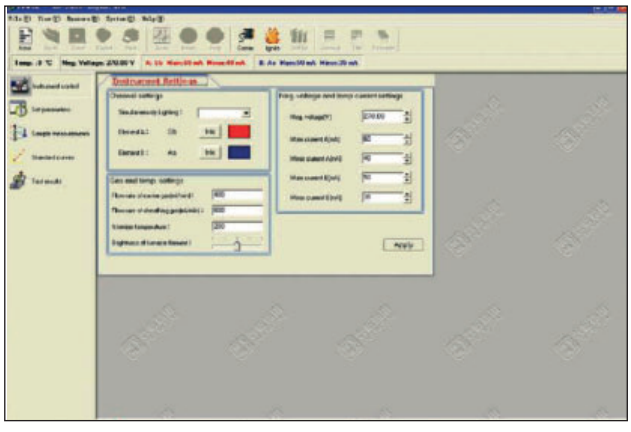
Detection Limits

Element	Detection Limit(ug/l)	RSD %
Arsenic (As)	<0.01ug/l	<1%
Bismuth (Bi)	<0.01ug/l	<1%
Cadmium (Cd)	<0.001ug/l	<1%
Germanium (Ge)	<0.05ug/l	<1%
Mercury Hg)	<0.001ug/l	<1%
Lead (Pb)	<0.01ug/l	<1%
Antimony (Sb)	<0.01ug/l	<1%
Selenium (Se)	<0.01ug/l	<1%
Tin (Sn)	<0.01ug/l	<1%
Tellurium (Te)	<0.01ug/l	<1%
Zinc (Zn)	<1.0ug/l	<1%

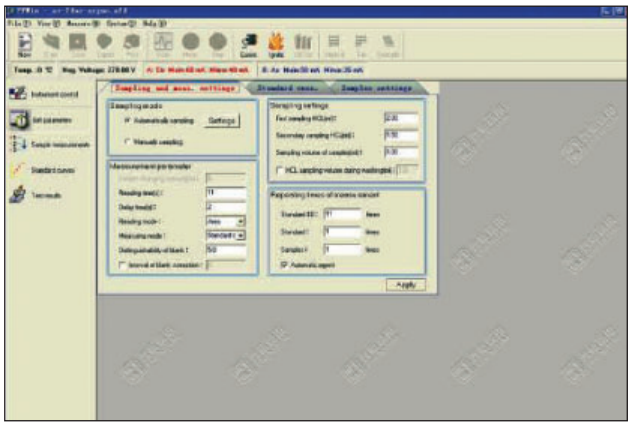
PFWin Software

The intuitive software package provides ease of operation, method development control and data acquisition. Software wizards simplify the operation and configuration.

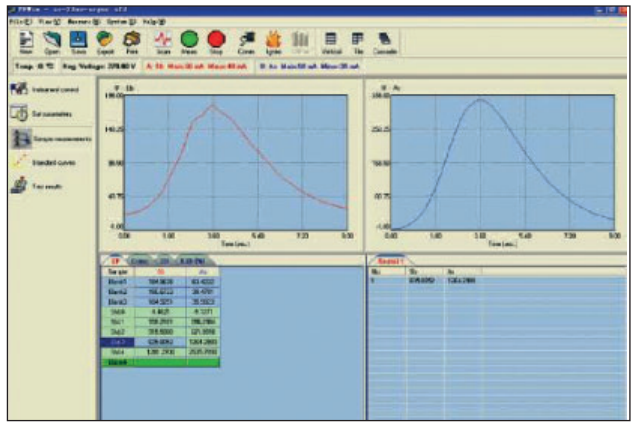




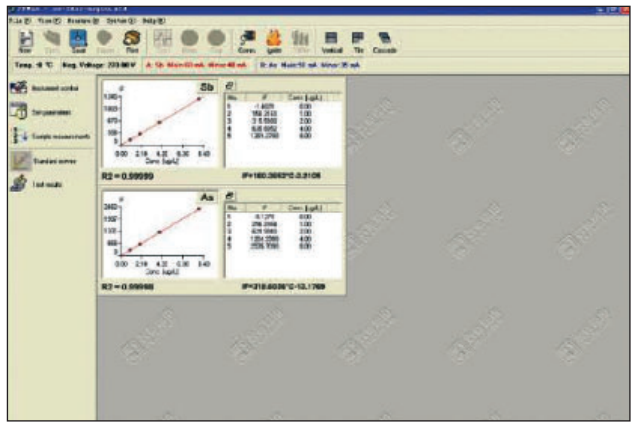
AFWin offers real time display of fluorescence intensity. Full adjustment of current for all hollow cathode lamps is provided. Lamps are set for optimal performance.



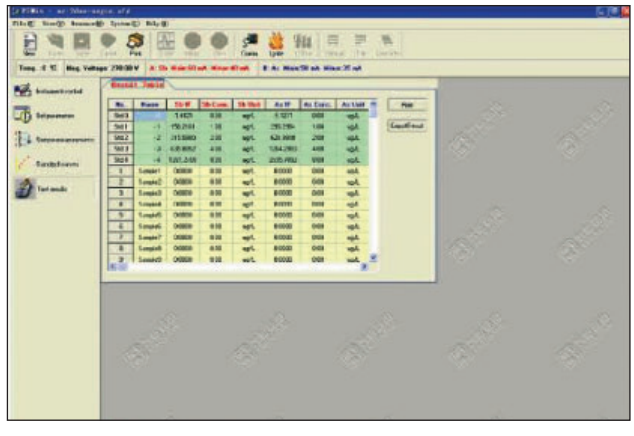
Where parameters are input manually, PFWin software will prompt the suggested parameters to complete the configuration for the analysis.



Detailed information and results are shown for each element analysed.



Calibration information as well as results for standards are shown for each element.



Detailed results for the analysis can be seen and saved. Reporting and QC control allows printouts of spectra, standard calibration curves, analysis and signal data. Report of operating parameters can be saved or printed for future information.

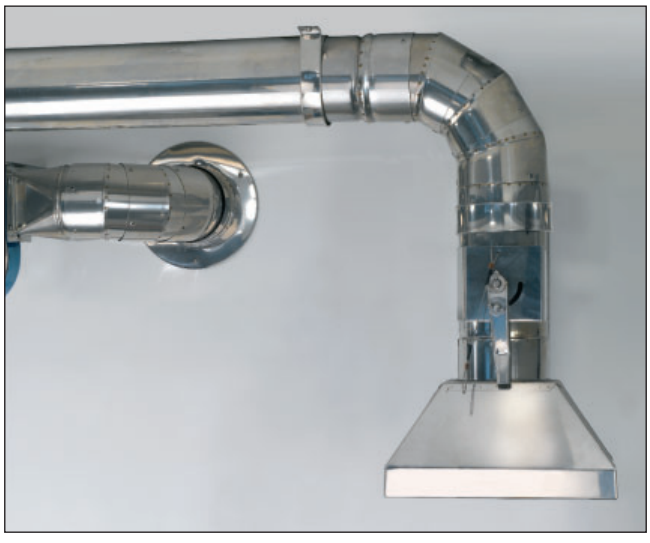
Specifications

Sample Atomisation	
Atomiser	Quartz tube furnace with auto ignition of argon/hydrogen flame
Furnace heating	Computer controlled heating
Hydride Generator	Continuous flow high performance for cold-vapour mercury and hydride determinations of As, Se, Te, Bi, Sb, Sn, Zn, Pb, Cd, Ge
Gas Requirement	High purity Argon gas(99.99%) 30psi pressure
Sample and delivery	
Peristaltic Pump	3 channel pump with 3 adjustable pressure control clamps and programmable
speed control.	
Exhaust System	Built in with filter to decontaminate pollutants
Gas/Liquid Separator	High efficiency two-stage gas-liquid separator.
Autosampler	
Type	Integrated XYZ
Sample Introduction	High sample capacity, automated introduction of sample and standards by motorised syringe drive.
Sample capacity	2 x 45 standard test tube sample racks
Optics	
Optical Design	Short focal length, non-dispersive integrated optical design.
Light source	3 channel simultaneous element analysis using computer controlled. Modulated and pulsed, hollow cathode light source.
Baseline stability	<2%
Linear range	$>10^3$
Computer system	
Type	Built in embedded PC system
Operating system	Windows
Operating software	PFWin software
Safety	Alarm for low gas <60ml/min. Gas cut off in the event of power supply loss
Power requirements	220Vac ±10% 50/60hz, 300W
Dimensions	100.6cm x 58cm x 55cm

Accessories

Argon Gas Regulator

- Direct fitting to gas cylinder
- Comply to British Standards
- Supplied with hose fitting and crimp
- Various gas cylinder fittings available
- Regulator for high purity Argon 99.99%
- Specify fitment to European standard

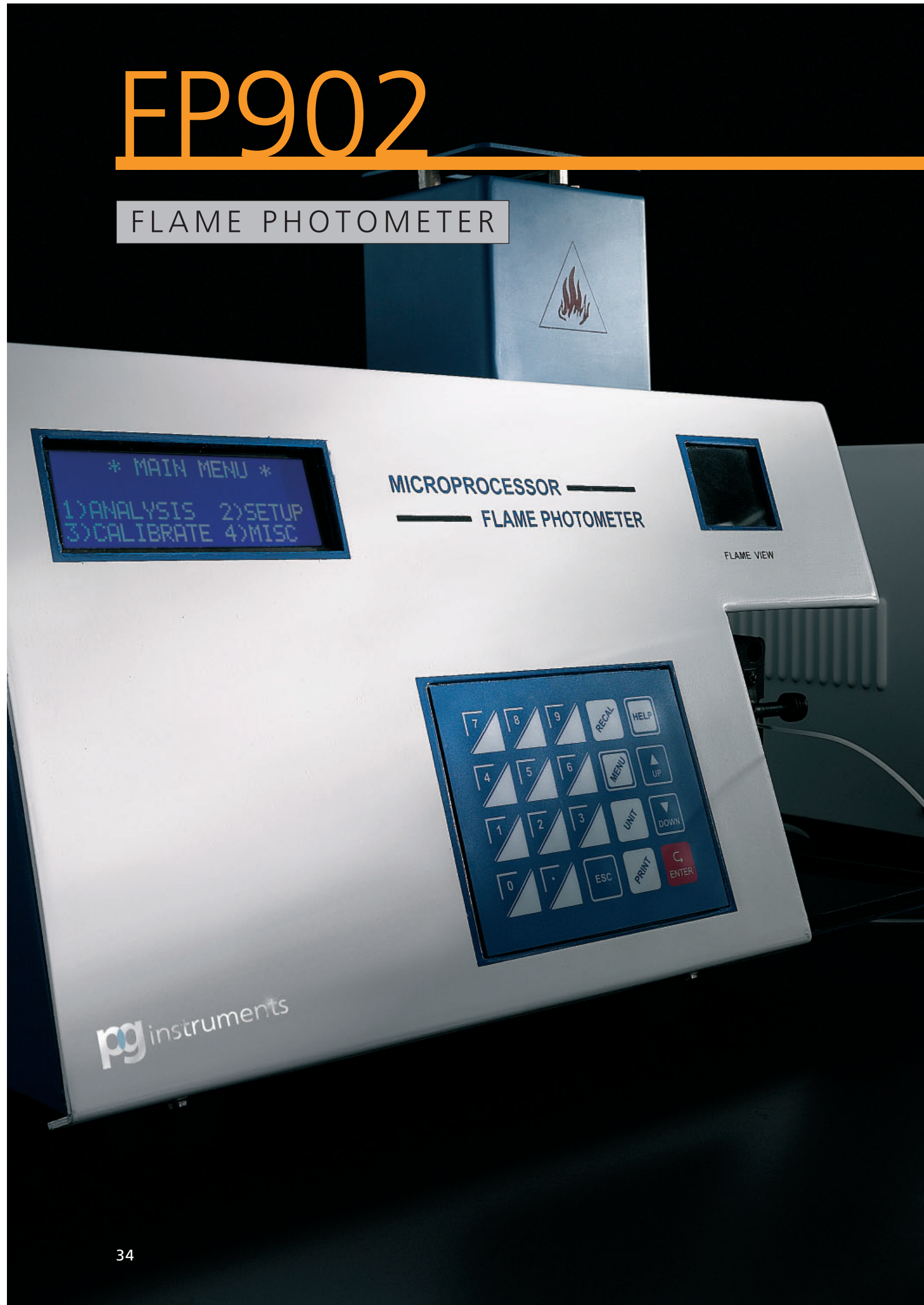


Fume Extraction System

- Universal fitting
- Stainless steel construction
- All fittings supplied
- 150mm polymer fan
- 240Vac 50/60hz
- 300mm diameter hood, adjustable height
- Adjustable bends from 0° to 90°

EP902

FLAME PHOTOMETER

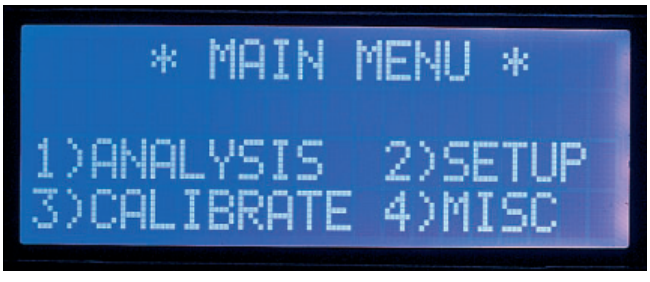


NOW WITH BARIUM

Flame photometry provides a simple method of analysis and concentration determination of elements which cannot easily be measured using any other technique. PG Instruments application notes for users of our versatile new flame photometers cover a wide range of industrial sectors, from food and drink to cement, minerals and glass, as well as agricultural, biological and clinical applications.

The PG Instruments FP902 Flame Photometer offers the combination of clinical, industrial and education applications in ONE instrument. It gives accurate, fast and precise analysis of sodium, potassium, calcium and lithium in one simple aspiration.

The FP902 uses a soft touch key pad for ease of data entry and features electronic ignition, automatic flame failure safety and will operate using butane, natural gas or LPG.



TYPICAL APPLICATIONS

- Soil and Agricultural Analysis
- Biological Fluids
- Petrochemical Industry
- Food and Drink Analysis

FEATURES & FUNCTIONS

- Five element measurement in a single aspiration (Na, K, Li, Ca and Ba).
- Curve calibration using up to 5 standards.
- Calibration curve fit routines first order and second order.
- Multiple calibration curve saving facility.
- Sample data storage.
- Printer attachment.
- Data displayed in concentration units ie. ppm, meq etc.

Specifications

Mode	General Analytical Applications	Serum	Urine
Range	Na: 0.1-100 ppm Up to 250 meq/l, 1:100 dil K: 0.1-100 ppm Up to 250 meq/l, 1:100 dil Ca: 15-100 ppm Up to 250 meq/l, 1:100 dil Li: 0.5-100 ppm Up to 250 meq/l, 1:100 dil	Na: 0-200 1:100 dil K: 0-10 1:100 dil Ca: - Li: 0-2 1:5 dil	Na: 0-250 1:100 dil K: 0-100 1:100 dil Ca: - Li: 0-10 1:2 dil
Sensitivity	General Mode: Na:0.5 ppm, K:0.5 ppm, Li:0.5 ppm, Ca:15 ppm, Ba:30 ppm		
Filters	Filters for Sodium, Potassium, Lithium, Calcium and Barium are included		
Resolution	0.1 ppm/meq		
Reproducibility	± 2% FS, & ± 2 Digits		
Curve Fit Accuracy	± 2% FS		
Display	20 x 4 Alphanumeric backlit LCD display		
Flame System	LPG & dry oil free air		
Detector	Silicon Photodiode		
Calibration	Up to 5-Point Calibration with curve fitting software		
Gas Control	Fully Adjustable		
Ignition System	Auto Ignition		
Atomiser	Axial flow type		
RS-232C Interface	RS-232 PC Software available		
Power	230 V ± 10% AC, 50/60 Hz		
Dimensions	365 x 245 x 220 mm (L x B x H) (Approx.)		
Weight	Main Unit: 7.5Kg. (Approx.)		

Compressor Unit

Air Supply	Oil free compressor unit with pressure regulator
Combustion Gas LPG	Controlled by precision regulator
Power	230 V ± 10% AC, 50/60 Hz
Dimensions	290 x 255 x 210 mm (L x B x H) (Approx)
Weight	8Kg. (Approx.)

Consumables

AA500

Hollow Cathode Lamps

- 1 1/2 inch standard lamp fitting
- 2 inch lamps available
- 70 single-element lamps
- More than 120 multi element lamps, up to 5 element per lamp
- Low current operation
- Long life >5000mA Hours
- Designed for use with SR background system

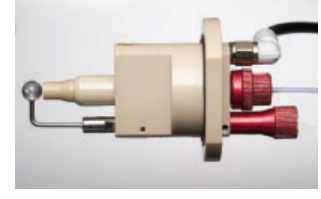
Multi Element Standards

- 500ml volume bottles
- More than 40 individual elements available
- 1.000g/ml (1000ppm) concentration
- Individual elements made up in a choice of acid solutions

Glass Fixed Flow Nebuliser

- Glass construction
- Fixed flow rate for easy installation.
- Acid resistant to 5%
- Easily replaced

Standard Nebuliser (Acid Resistant available)



- Fully insert nebuliser
- Adjustable uptake from 2-6ml/min
- Fully adjustable impact bead
- Excellent RSD's typically <1.0%
- Typical read back values better than 2%
- Enhanced sensitivity
- Can be used on all PG Instruments AA500 and AA990 series atomic absorption systems
- Redesigned spray chamber to ensure excellent drainage properties

Graphite Tubes

- Pyrolytically coated graphite tube
- Supplied with or without platform
- High quality long life tubes
- Can be used for larger samples >20ul

Sample Uptake Tubes

- Replacement sample uptake tubes
- Attached filter to eliminate solid uptake
- Standard length
- Easily replaced

Deuterium Lamp

- High energy lamp
- For use with AA500 instrument
- Easy fit
- No alignment required

Auto Sampler Vials – Flame Samples

- Re-useable glass vials
- For use with AS500 Auto Sampler
- Larger volume for samples 6ml

Consumables

AA500

Auto Sampler Vials – Flame Standards

- Re-useable glass vials
- For use with AS500 Auto Sampler
- Larger volume for standards 12ml

Auto Sampler Vials – Graphite Samples/Standards

- Re-usable vials
- For use with AS500 autosampler
- 1.5ml volume for samples and standards

Auto Sample Vials – Graphite Modifier Solutions

- Re-useable glass vials
- For use with AS500 Auto Sampler
- Larger volume for modifier solution 12ml

Micro Pipette

- Used for manual injection
- Adjustable volume
- Accurate dispensing volume
- For use with AA500 Graphite Furnace

Micro Pipette Tips

- Disposable tips
- For use with micro pipette

Consumables

AA990

Hollow Cathode Lamps

- 1 1/2 inch standard lamp fitting
- 2 inch lamps available
- 70 single-element lamps
- More than 120 multi element lamps, up to 5 element per lamp
- Low current operation
- Long life >5000mA Hours
- Designed for use with SR background system

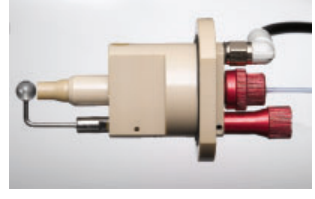
Multi Element Standards

- 500ml volume bottles
- More than 40 individual elements available
- 1000g/ml (1000ppm) concentration
- Individual elements made up in a choice of acid solutions

Glass Fixed Flow Nebuliser

- Glass construction
- Fixed flow rate for easy installation.
- Acid resistant to 5%
- Easily replaced

Acid Resistant Nebuliser



- Fully insert nebuliser
- Adjustable uptake from 2-6ml/min
- Fully adjustable impact bead
- Excellent RSD's typically <1.0%
- Typical read back values better than 2%
- Enhanced sensitivity
- Can be used on all PG Instruments AA500 and AA990 series atomic absorption systems
- Redesigned spray chamber to ensure excellent drainage properties

Sample Uptake Tubes

- Replacement sample uptake tubes
- Attached filter to eliminate solid uptake
- Standard length
- Easily replaced

Deuterium Lamp

- High energy lamp
- For use with AA500 instrument.
- Easy fit
- No alignment required.

Auto Sampler Vials – Flame Samples/Standards

- Re-useable glass vials
- For use with AS990 Auto Sampler
- Larger volume for samples

Auto Sampler Vials – Wash

- For use with AS990 Auto Sampler
- Large volume for wash
- Re-usable

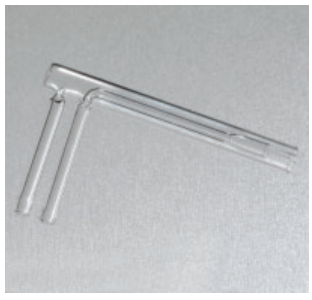
Consumables

AF402

Hollow Cathode Lamps

- High performance – High output lamps
- Lamps designed for use with AF402 system
- Built in circuit for coding and usage recording
- Available for analysis of a variety of elements including: Sb, As, Bi, Cd, Ge, Pb, Hg, Se, Te, Sn, Zn

Quartz Atomiser



- Quartz Glass – to withstand heat and chemicals
- Replacement required at regular intervals
- Inputs for gas and hydride vapout

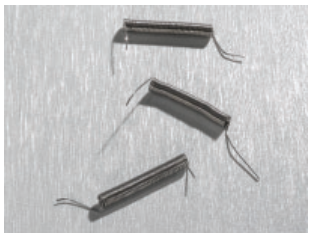
Injection Tubes

- Quartz Glass – to withstand high acid solutions
- Designed to fit in the XYZ autosampler

Glass Mixing Chamber

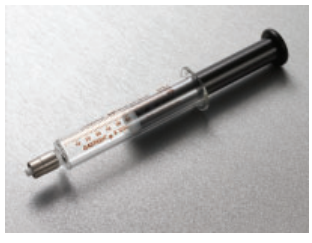
- Quartz glass
- Built in gas separator
- Easily replaced

Heater Coils



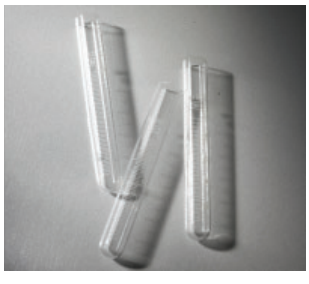
- Replacement wire coils
- Fits around the Quartz Atomiser
- Used for heating the atomiser when used for hydride analysis
- Regular replacement suggested

Syringe



- Accurate high quality
- Used for accurate uptake of sample and carrier liquid
- Requires regular flushing

Sample Cups Small



- Re-usable glass cups
- Used in XYZ autosampler for standard solutions

Standard Solutions

- 500ml volume bottles
- Individual elements available for Sb, As, Bi, Cd, Ge, Pb, Hg, Se, Te, Sn, Zn
- 1.000g/ml (1000ppm) concentration

Consumables

FP902

Air Compressor

- Matching air compressor designed only for use with FP902 instrument
- Oil free air
- Adjustable air supply with gauge
- 220v 50/60hz

Nebuliser

- Cross flow design
- Adjustable uptake rate
- High quality capillary tube

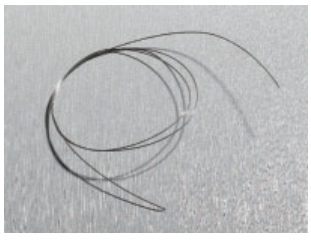
Burner

- Fits into premix chamber
- Designed for use with low pressure propane flame
- Easily removed for cleaning

Capillary Tubes

- Fit onto capillary tube of nebuliser
- Optimised length
- Used for sample uptake
- Easily fitted and replaced

Cleaning Wires



- Fine wire length
- Used to clean blockage in capillary tube of nebuliser

Sample Cups

- Re-usable glass cups
- Used for holding samples and standard solutions
- Small volume size for use with FP902 instrument

We reserve the right to modify, revise/upgrade, suspend or discontinue any Product in whole or in part, either temporarily or permanently, with or without notice.

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